gard to this deposit, and which indeed induces me to make this communication, is the occurrence in it of water-worn remains of *Iguanodon*. Of this reptile I have obtained one of the phalanges, a worn tooth, vertebræ, and one or two other fragments. The presence of these rolled fossils so far beyond the present area of the Wealden, coupled with the occurrence of numerous fragments of fossil wood strongly resembling that found in the Purbeck beds, seems to prove that, previously to the formation of this deposit, an extensive denudation of Wealden strata must have taken place in this district.

IX.—*Notes on the Palæozoic Bivalved Entomostraca.* No. VII. *Some Carboniferous Species.* By T. Rupert Jones, F.G.S., and James W. Kirkby, Esq.

With the view of working out the characters and classification of the Bivalved Entomostraca of the Carboniferous Rocks, we have had to determine the specific value of the forms already published by palæontologists. In the 'Annals and Mag. Nat. Hist.' for May 1865 (ser. 3. vol. xv. p. 404, &c.) we gave the results of our examination of some Bavarian specimens (with which Dr. C. W. Gümbel obligingly favoured us), whereby we were enabled to determine Count Münster's eight Carboniferous species—the oldest on our list, having been published in 'Leonhard's Jahrbuch' for 1830.

1793. *Ure.*—Before proceeding to discuss the species published subsequently to 1830, we have to notice some figured but unnamed forms, well known to the students of Scottish geology, who have to refer to Ure's 'History of Rutherglen and East Kilbride' (8vo, 1793). In this work the Rev. David Ure noticed the existence of certain "microscopic bivalved shells" (Entomostraca) in the Carboniferous Limestones near Glasgow, and supplied his friends with suites of these little fossils, together with minute Gasteropods; and tastily mounted sets, in glazed frames, are still preserved in the Hunterian Museum in the Royal College of Surgeons, London, and in the Museum of the Andersonian University, Glasgow. (See the very interesting 'Biographical Notice of the Rev. David Ure,' &c., by John Gray, 8vo, Glasgow, 1865.) "Both John Hunter and Dr. Anderson were friends of Ure; and as these microscopic fossils were found in Hunter's native parish, they would be the more prized on that account." (Mr. John Young, *Letter.*)

Four or five of the little Entomostraca were figured and described by Ure in his 'History of Rutherglen,' &c. One of them (pl. 14. fig. 15), a subreniform *Cythere* (?), small, white,

and polished, was the most numerous of those mentioned; another, also white and polished, but larger and scarcer, is subtriangular, and evidently a *Bairdia* (fig. 20), somewhat crushed —a condition noticed by Ure; it was rare, in a limestone-quarry fifteen miles west of Newcastle-on-Tyne, near the spot where the Roman wall is intersected by Watling Street. Figs. 16,17, and 21 are given as different views of one form, the scarcest of all: fig. 21 is certainly a *Kirkbya* badly drawn; and the other two are Beyrichian in appearance (*Beyrichia bituberculata*, M'Coy, sp.).

Among the mounted specimens in the Hunterian Museum are *Leperditia Okeni*, Münster, var., *Cytherella*, *Bairdia curta*, M'Coy, *B. subcylindrica*, Münster, and the *Kirkbya* roughly indicated by Ure's fig. 21, which is *K. Urei*, Jones (Trans. Tyneside Nat. Field-Club, 1859, p. 136; and Gray's 'Biograph. Notice,' &c., p. 52).

Dr. Ure's microscopic specimens seem to have been collected chiefly at Lawrieston and Stuartfield (East Kilbride). It is only of late that the energetic geologists of Glasgow have been able to rediscover the exact strata which yield them. In a letter dated July 4, 1865, our friend Mr. John Young, of Glasgow, states—

"Since I began to pay any attention to the collecting of Entomostraca, I have often searched for the bed in which David Ure obtained the specimens figured in his book, and also mounted in the Hunterian Museum in London and in the collection of the Andersonian Institution in Glasgow; but as the quarries from which he got them have been filled up, and as Ure does not tell the nature of the strata from which he collected them, I have never been able to find them until the last week or two. In examining some shale from the Calderside old limestone-quarries, near High Blantyre, Lanarkshire, I was fortunate in again discovering Ure's bed for the *Kirkbya*, &c. It lies between two beds of limestone, which crop out in both Blantyre and East Kilbride parishes. This bed of shale is loaded with organisms in a more or less perfect condition, namely Corals, Polyzoa, Brachiopoda, Conchifera, Crinoids, Bivalve Entomostraca, Trilobites, &c. The shale soon breaks up on exposure to the weather, and then the minute organisms can easily be extracted from it by washing." Mr. John Young then refers to some mounted specimens of *Bairdiæ*, *Kirkbyæ*, *Cytherellæ*, and *Foraminifera*, from this shale, that were kindly sent in his letter, and adds, "I find, on comparing the figures given by Ure with the Entomostraca from Calderside, that he has made a mistake in confounding two distinct forms as belonging to the same species. Figs. 16, 17, and 21 he thought were the same. I find

that figs. 16 and 17 are intended to represent *Beyrichia tuberculata*, M'Coy, sp., which is sparingly found in the Calderside shale together with *Kirkbya Urei*, Jones, which Ure produces in fig. 21. It is strange that he should have made this mistake, as the two shells are quite distinct to the naked eye under every aspect."

1834. *Hibbert.*—In 1834, Dr. Hibbert brought to the notice of the British Association at Edinburgh, and in 1836 he described, in the 'Transactions of the Royal Society of Edinburgh' (vol. xiii.), some Entomostraca from the Carboniferous strata near Burdiehouse, which are rich in these minute carapaces, mostly, however, belonging to one species*. At page 179 of his memoir he gave small woodcut figures of his *Cypris Scotoburdigalensis*, and at page 180 others of his *Daphnoidia*. The latter received the name of "*Hibberti*" in Morris's 'Catalogue of British Fossils,' first edition, 1843. Dr. Hibbert's specimens were again noticed by Mr. L. Horner in the 'Edinburgh New Philosophical Journal' for April 1836, and were regarded as indicating an estuarine (and not a freshwater) origin for the strata containing them.

Among the many Carboniferous specimens lent to us by our friend Mr. E. W. Binney, F.R.S., are several bearing minute Entomostraca that were in Dr. Hibbert's collection. In these, "*Cypris Scotoburdigalensis*" is abundant; but *Daphnoidia*, unfortunately, does not appear. Nor can we form a satisfactory conclusion as to the nature of this little fossil from Dr. Hibbert's woodcuts. The so-called "*Cypris*" is readily recognized to be a dwarf *Leperditia*, with the characteristic muscle-spot, and possessing even the hump on the back of the left valve, so marked a feature in some members of that genus. Excepting in relative size, no distinction can be discerned between *Leperditia Scotoburdigalensis* and *L. Okeni*; and we find very many gradations in size among these little *Leperditiæ* of the Carboniferous shales and limestones, including *L. Okeni* as a large form and *L. Scotoburdigalensis* as the smallest. Two or more of these varieties are often associated together, sometimes probably as young and old conditions, but often as varieties determined by mode of growth. Some slight differences in the outline of the valves, or in the profile of the carapace, occasionally accompany variation in size; and, taking these together, we use them as

* In more than one of the many samples of the Burdiehouse limestone and shale that we have examined, we have noticed what appears to be a more elongate (and *Cythere*-like) form than *Leperditia Scotoburdigalensis*; but the specimens are so imperfect as not to be determinable. We may say the same in respect to other crushed specimens from this locality, that resemble *Beyrichia subarcuata*, Jones.

distinctions for nominal varieties. Thus *L. Scotoburdigalensis* may be allowed to stand as a sufficiently distinct variety of *L. Okeni*, though possibly it really differs only in having been dwarfed by unfavourable circumstances of growth.

In the Lower Carboniferous shales and limestone of Burdiehouse* we see *Leperditia Scotoburdigalensis* in company with *Spirorbis* (*Microconchus*) *carbonarius* (not very abundant there), abundant Fish-remains, *Lepidodendron*, *Lepidostrobus*, *Sphenopteris*, &c.

This smallest of the many varieties of *Leperditia Okeni*, occurring in the Lower Carboniferous limestones and shales of Great Britain and Ireland, has been found at Burdiehouse (by Hibbert, Horner, Binney, Sorby, Crosskey, the Geological Surveyors, and others); Granton (Harkness); Pittenweem, in Fifeshire (Hunter); Bathgate (Young); Arundale, near Bathgate (Young); Hurlet, S.W. of Glasgow (Crosskey); Carluke (Rankine); Lammerton and Cockburnspath, Berwickshire (G. Tate); and at many places in Ireland by Sir R. Griffith and the Geological Surveyors. (See further on.)

One of us long ago saw that this little Entomostracan could not be a *Cypris*, nor a *Cythere*, and put it with *Cytheropsis* (a provisional genus). Hence it appears under that name in the 'Monograph of the Fossil *Estheriæ*' (Palæontographical Society, 1862) and in some other works. It was definitely referred to *Leperditia* by us in 1863 (Brit. Assoc. Report, 1863, Sections, p. 80; and 'Geologist,' vol. vi. p. 460).

1836. *Bean.*—In 1836 Mr. W. Bean, of Scarborough, described in the 'Magazine of Natural History,' vol. ix. p. 377, a little Entomostracan from the Coal-measures of Newcastle-upon-Tyne, as *Cypris arcuata*; and illustrated it by a woodcut (fig. 55). This is really a *Beyrichia*, and has been so referred to, on the authority of one of us, for several years past.

Beyrichia arcuata is one of the most widely distributed Entomostraca in the Coal-measures of England and in the "Upper Coal-measures" of Scotland. It has also been found in the shales of the so-called "Millstone-grit" of Lancashire and in the Lower Carboniferous shales of Scotland, but not in the Mountain-limestone, or equivalent portions of the Carboniferous Series, in England. We have it from the Ryhope Colliery, near Sunderland, in shale, about 8 or 10 feet below the base of the Permian strata; from Claxheugh, near Sunderland, in ironstone; from Hylton, near Sunderland, in ironstone; from Prestwick, Northumberland, in carbonaceous shale (Atthey); from Loughton,

* For a full account of the Carboniferous Strata of Burdiehouse, see the 'Memoirs of the Geol. Survey,' &c.: "Geology of the Neighbourhood of Edinburgh," by Howell and Geikie, 1861, p. 36, &c.

Staffordshire, in shale (J. Ward); in ironstone from the Coal-measures near Dudley (Geol. Survey); from Chesterfield in ironstone (Binney); from Babbington, Notts, in shale; from Shaley Brow, Rainford (Binney); from Glodwick, near Oldham (Binney); from Agecroft Colliery, near Manchester (Binney); from Ashby-de-la-Zouch (A. H. Green); from Eagley Shore, Lancashire, and from Holcombe, Bradshaw, Cranbourke, and Brow Peel in the same county; from Granton (Harkness); from Carluke (Rankine); and from the shales associated with the Shotts Gas- and Furnace-Coals, Lanarkshire (Grossart).

In the 'Memoirs of the Geological Survey,' illustrative of the several sheets of the Geological Survey Map, are several references to the occurrence of Bivalve Entomostraca in the Coal-measures. *Beyrichia arcuata* is quoted as occurring in shales of the Middle and Lower Coal-measures of Lancashire and of the "Holcombe-Brook Series" (referred to the "Millstone-grit" by the Surveyors) in the same district: Mem. Geol. Surv., "Geology of the Country around Bolton-le-Moors," by Mr. E. Hull, 1862, pages 33, 34, 40, &c. *B. arcuata* is also mentioned as belonging to the Middle Coal-measures, near Wigan, in the 'Geology of the Country near Wigan,' 2nd edit. 1862, Appendix *, by Mr. Salter, pp. 36 and 38, and is figured in a woodcut at p. 37 (fig. 2, 5).

1836. *Phillips and Williamson.*—In 1836 Professor J. Phillips (Brit. Assoc. Report, 1841, Sections, p. 64) and Professor W. C. Williamson (Phil. Mag. new series, vol. ix. p. 351) discovered numerous small Entomostraca in the Upper Coal-measures at Ardwick, near Manchester (see 'Monograph Foss. Estheriæ,' Pal. Soc. p. 118). Excepting a few specimens of *Leaia*, these Entomostraca were referred to as *Cyprides*, and are possibly the same as *Cypris inflata* of Murchison, which is found in the uppermost Coal-measures of Shropshire.

1839. *Murchison and Sowerby.*—In 1839 Sir Roderick Murchison and Mr. J. de C. Sowerby described and figured a small Bivalve Entomostracan (obtained by the former from the Upper Coal-measures of Shropshire) as *Cypris inflata*, in the 'Silurian System,' p. 84, woodcuts figs. A 1, A 2, A 3, which figures were repeated in 'Siluria,' 1st and 2nd editions (2nd edit. 1859, p. 322, fig. 83), and have been copied in other works on geology. These illustrations are really those of a small gibbous *Leperditia*,—with a straight back, strong dorsal angles, and convex ventral margin. In the 'Silurian System,' p. 84, it is

* In this Appendix, p. 37, fig. 2, 4, is figured another *Beyrichia* (under the name of "*B. Binneyana*, Jones"), which is *B. subarcuata*, Jones, Pal. Soc. 1862, Monogr. Foss. Esth. p. 120, pl. 5. fig. 16. The name "*B. Binneyana*" was intended for a different form as yet unpublished.

stated that a band of freshwater limestone stretches from Nobold near Shrewsbury to Asterley beyond Pontesbury, and is found in the Coal-measures between Westbury and Pontesbury; and it is described as containing *Cypris inflata*, together with *Spirorbis* (*Microconchus*) *carbonarius*, and as being equivalent to the Ardwick limestone, in which this latter little fossil also abounds. This Spirorbis-limestone occurs also in the uppermost Coal-measures of Warwickshire. See Geol. Survey Memoirs, 1859.

Mr. J. W. Salter has obtained for us, through the kind aid of Mr. R. Wilding, of Church-Stretton, a specimen of the whitish so-called "freshwater" limestone of the Upper Coal-measures of Lee-Botwood, Shropshire. This contained a few specimens of a dwarf *Leperditia* and many minute *Spirorbes** (*Microconchi*). Mr. E. W. Binney has also favoured us with specimens of the same Spirorbis-limestone from Ardwick, near Manchester; Prizely, Shropshire; Rough Gill near Galescales, Carlisle; and from the banks of the Ayr near Catrine, Ayrshire. Some of these specimens enclose imperfect individuals of the same dwarf *Leperditia*. In another specimen of the white limestone that we have seen in the Ludlow Museum, *Spirorbis* abounds, but no Entosmostraca are visible.

On account of the compact and crystalline condition of this rock, it is very difficult to manipulate the little bivalve carapaces, or their representative casts in the limestone; but, though not so successful as we wished, we had evidence of such a little *Leperditia* as that figured by Murchison and mentioned above; and we have no doubt that this is very similar to *L. Scotoburdigalensis*, its greater breadth or ventricosity alone distinguishing it. Hence we may keep the varietal name *L. inflata* for the gibbous dwarf form of *L. Okeni* occurring in the south, whilst *L. Scotoburdigalensis* is an equally small, but less swollen, dwarf variety, found in the north of Britain, as well as in Ireland.

1839. *M'Coy.*—In 1839 Professor F. M'Coy figured and described as *Entomoconchus Scouleri*, in the Journal of the Geological Society of Dublin (vol. ii. p. 91, pl. 5. figs. *a–e*), a large globose bivalved Entomostracan, common in some parts of the Mountain-limestone, both of the British Isles and the Continent. This form had already been recognized as occurring in the Mountain-limestone of Yorkshire (Bolland) by Professor John Phillips, and referred to by him in his 'Geology of the Mountain-Limestone District of Yorkshire,' pages 240 and 251, as a "Cypridiform shell," but not described, though sketches of

* *Spirorbis* (*Microconchus*) is abundant also in some of the limestones of the Middle and Lower Coal-measures and of the Limestone-shales (Ireland).

it are given in pl. 22. figs. 23 & 24 of that work. In a provisional notice of the Entomostraca of the Carboniferous period*, we have been enabled to point out some of the relationships of this curious fossil, in M'Coy's figures of which the hinge-line is by mistake assigned to the anterior extremity.

This fossil is known to us by specimens from the Carboniferous Limestone of Cork, Kildare, Meath, and Limerick (Griffith, D. Sharp, J. Wright, British Museum, Geological Survey); Bolland, Yorkshire (Phillips, Morris); Park Hill, near Longnor, Derbyshire (Geol. Survey); Lower Scar Limestone, Settle (Burrow); Braidwood Limestone, Carluke (Hunter); Carboniferous shales of West Broadstone, Ayrshire (J. Young). The Rev. J. Cumming found it in the Carboniferous Limestone of the Isle of Man (Quart. Journ. Geol. Soc. vol. iii. pp. 322, 355). At Visé, in Belgium, it is not rare in the white Carboniferous Limestone.

1842. *De Koninck.*—In 1842 six species of Bivalved Entomostraca from the Carboniferous Limestone of Belgium were carefully figured and described by Professor Dr. L. de Koninck, of Liége, in his 'Description des Animaux Fossiles qui se trouvent dans le Terrain Carbonifère de Belgique' (4to, Liége, 1842–44). At page 585, under the name *Cythere Phillipsiana* (pl. 52. fig. 1), we have the peculiar gibbous form common in some of the beds of the European Mountain-limestone, and which had been named *Entomoconchus Scouleri* by M'Coy in 1839. At page 587 De Koninck describes his *Cypridina Edwardsiana* (pl. 52. fig. 2), and *C. concentrica* (fig. 4), and at p. 588 his *C. annulata* (fig. 3); but the generic affinities are not well determined, owing probably to the fact of the peculiar antero-ventral notch in the valves of *Cypridina* having been omitted in the engraving of Milne-Edwards's typical species (as explained in the 'Monograph of the Tertiary Entomostraca of England,' Pal. Soc. 1856, p. 9), and the palæontologist having been thereby misled in collocating the fossil carapaces with their recent analogues. At page 589 of M. de Koninck's work, his *Cyprella chrysalidea* (pl. 52. fig. 6) is described, and his *Cypridella cruciata* (fig. 7) at page 590.

These Entomostraca occur also in Great Britain, as well as the curious Crustaceans, *Cyclus Brongniartianus*, Kon., and *C. radialis*, Phillips, sp., described and figured in the same memoir, but of obscure relationship. A form allied to the latter has also been found by Mr. Joseph Wright in the Carboniferous Limestone of Little Island, Cork, and by Mr. J. H. Burrow at Settle; another belongs to the Magnesian Limestone of Sunderland;

* Report of the British Association, 1863, Sections, p. 80.

and a much earlier instance of the occurrence of the genus is in the Silurian Limestone of Keisley in Westmoreland, where it was discovered in 1864 by Professor R. Harkness, F.R.S.

A collection of Belgian Bivalve Entomostraca presented to one of us a few years ago by M. J. Bosquet, of Maestricht,—a collection of fossil *Cyprinidæ* from Little Island, Cork, sent us by Mr. Joseph Wright, F.G.S.,—and a collection submitted to us by Mr. J. H. Burrow, M.A., of Settle, Yorkshire, enable us to unravel some of the obscurities of this group, which had its representatives even in Silurian times*, and is still largely represented in the present seas. We intend, however, on the present occasion merely to mention what we believe to be the real relationships of M. de Koninck's species, as already indicated in the 'Neues Jahrbuch' for 1864, p. 54, and in the 'Canadian Naturalist and Geologist,' new series, vol. i. p. 237, where we have stated that M'Coy's *Daphnia primæva* is a *Cypridina*, De Koninck's *Cypridina Edwardsiana* and *Cypridella cruciata* are *Cypridellæ*, his *Cypridina annulata* and *Cyprella chrysalidea* are *Cyprellæ*, and his *Cypridina concentrica* is an *Entomis*.

1843. *Portlock.*—In 1843 the late General (then Captain) Portlock, in his Report on the Geology of Londonderry, p. 316, treated of two Entomostraca from the Carboniferous Shales of Derry, Tyrone, and Fermanagh, Ireland, namely *Cypris Scotoburdigalensis* (Hibbert) and *Cypris subrectus* (Portlock); and illustrated the former by fig. 13 *c*, and the latter by fig. 13 *b*, of his plate 24. *C. subrecta* (the original specimen of which we have seen, by the kindness of the officers of the Geological Survey Museum, Jermyn Street) is very similar to the first-named in shape, but is somewhat larger. Both are varieties of *Leperditia Okeni*; and, together with numerous very similar comrades, they infested the salt and brackish waters of the early Carboniferous period in nearly every region of the northern hemisphere, acting as scavengers† on the decaying animal and vegetable materials in the muddy shallows and lagoons. As *Leperditia subrecta* represents a size above that of *L. Scotoburdigalensis*, and does not *exactly* correspond to any of the Bavarian

* In the pebbles of Silurian quartzite in the Conglomerate at Budleigh-Salterton (Quart. Journ. Geol. Soc. vol. xx. p. 283; and Geol. Mag. vol. i. p. 5), Mr. Salter has discovered a specimen very closely allied to *Cypridina*; and Mr. G. Haswell has found others in the Upper Silurian beds of the Pentland Hills.

† Since the publication of the 'Monograph of the Fossil *Estheriæ*,' Pal. Soc. 1862, in which allusion is made to the garbage-eating habits of the small Entomostraca, we see that Prof. Phillips, as far back as 1841, pointed out the common association of Fish-remains with Cyprids (Brit. Assoc. Rep. 1841, Sections, p. 65).

forms described in our former memoir, it will be convenient to retain the name as that of a variety.

In the second part of his 'Verstein. Grauwacken Sachsens' (1853), p. 23, Dr. Geinitz described a small Bivalve Entomostracan, which he termed "*Cytherina subrecta*, Portlock," and which he found at the Gunzenberg, near Plauen, in company with the tail-spines of *Dithyrocaris Murchisoni*; and he remarked that, as Portlock found his specimens with *Dithyrocaris*, the circumstances are alike for the Silurian and the Carboniferous organisms. But Geinitz's *Cytherina subrecta*, as illustrated by him at pl. 19. fig. 20 of the work above referred to, is very different in appearance from Portlock's *C. subrecta*, being narrower in proportion, *incurved* both on the dorsal and ventral margins, bordered by a flat rim (apparently) all round, and rounded equally at the ends. The Silurian spines of the so-called "*Dithyrocaris*" are very probably those of *Ceratiocaris*.

Leperditia Okeni of the size and form of *L. subrecta* occurs at Fermanagh, Ireland (Portlock); Blackwell, near Bristol (Moore); Great Orme's Head (Dr. Holl); Whorlton, Teesdale (Parker); Wyebourne, Cumberland (Bland); banks of the Wansbeek (Pecket); Barnard Castle (Barron); Carluke (Hunter); West Broadstone, Ayrshire (Thomson); Orchard, near Thornliebank (Armstrong); Gare, Carluke (Thomson); Howrat Quarry, near Dalry (Armstrong); Craigenglen (Young and Crosskey); Campbeltown (Thomson); Carboniferous Limestone, Ashford, Derbyshire (Geol. Survey); Carboniferous Shales, half a mile south of Mitcheldean (Geol. Survey); and at many places in Ireland (Griffith and Geological Surveyors). See further on.

1844. *M'Coy.*—In 1844 Professor M'Coy considerably enlarged our knowledge of the Entomostraca of the Carboniferous Rocks by the description and illustration of twenty-two forms (including *Entomoconchus Scouleri*), besides two species of *Dithyrocaris* (*D. Scouleri* and *D. tenuistriatus*), all from the Lower Carboniferous strata of Ireland.

Thanks to the courtesy of Sir Richard Griffith, Bart., we have been enabled to examine many of the specimens described by Prof. M'Coy, and thereby to make our comparisons more surely.

The localities of nearly all the specimens described by M'Coy (and all that we have had in hand) have been given by Sir R. Griffith in the 'Journal Geol. Soc. Dublin,' vol. ix. (1860), pp. 21 &c.; and indeed the specimens retain their original labels, with the localities indicated.

On comparing the specimens with the figures in the 'Synopsis of the Characters of the Mountain-Limestone Fossils of Ireland,' pl. 23. figs. 4–25, we fail in recognizing several of M'Coy's

species on the hand-specimens bearing their names on the labels: they may perhaps have fallen out*. Some of the figures referred to represent, we are sure, only modified conditions of carapaces, either partially imbedded in the matrix or altered by pressure; some are for certain badly drawn; and in many cases the edge-views of the carapaces must, we think, have been constructed from the lateral profiles of imbedded valves, and are therefore rarely of much value†.

The figures in Prof. M'Coy's plate 23 are not drawn on a true scale; so that some specimens $\frac{1}{2}$ line long have larger figures than some one line long.

Having carefully examined the several labelled hand-specimens of shale and limestone lent to us by Sir R. Griffith, we propose to make some remarks on the Entomostraca that we have met with in them; and at the same time we shall offer our opinion on such of Professor M'Coy's species as are figured in pl. 23 of the 'Synops. Charact. M. Limest. Foss. Ireland,' but have not reached us, or are not now to be seen on the hand-specimens.

1. "*Entomoconchus Scouleri.* Lower Carboniferous Limestone; Little Island, Cork." Synops. Carb. Foss., Ireland, p. 164, pl. 23. fig. 4. Griffith, List of Localities (Journ. Geol. Soc. Dublin, vol. ix.), p. 68. A cast, in grey crystalline fossiliferous limestone.

1*. Another cast, in similar limestone; Millicent, Clane, co. Kildare.

1**. Another specimen (labelled "*E. Scouleri.* Upper Carboniferous Limestone; Black Lion, Enniskillen, co. Leitrim," Localities, p. 80) is a dark-coloured crystalline shelly limestone with a *Cyclus*.

2. "*Daphnia primæva.*" Synops. p. 164, pl. 23. fig. 5. Stated to be $1\frac{1}{3}$ long, and $\frac{3}{4}$ line deep, not very uncommon in some localities, and possibly to be the same as Hibbert's *Daphnoidia*. The specimen was not sent to us, nor is it mentioned in the List of Localities, and has therefore probably been mislaid. It certainly is a *Cypridina* as far as the appearance of the valve is concerned, whatever Dr. Hibbert's specimens may have been (see above, p. 34).

3. "*Bairdia curtus.* Arenaceous shale; Granard, co. Long-

* In the 'Dublin Quarterly Journal of Science,' No. XIX. July 1865, Mr. John Kelly explains that in 1853 Sir R. Griffith's collection, comprising these specimens, was removed from his house to the Great Exhibition in Dublin, and that many of the specimens of shale crumbled away. Hence, probably, the loss of several specimens.

† In 1847 M. J. Bosquet, in his "Descript. Entom. Foss. Maestricht," p. 4, *note*, offered some criticisms on M'Coy's species, but not sufficiently well founded to be of use.

ford." Synops. p. 165, pl. 23. fig. 6; Local. p. 100 ("Carboniferous slate and arenaceous limestone," Local. p. 48). Grey limestone, with *Spirifer*, Crinoids, &c., and some obscure Entomostracan valves besides the *Bairdia* under notice. This is in good preservation. In 1859 one of us carefully examined the specimen, and, having cleared away some of the matrix, considered the carapace to have been sufficiently well shown, and regarded it as being somewhat different from *Bairdia plebeia*, Reuss, in exhibiting less convexity in the antero-ventral edge. Unfortunately this very convexity could even then have been found by greater boldness of manipulation; for a year afterwards, on again closely examining the specimen, it came out of the stone, quite perfect, showing a fully curved hatchet-edge, as in *B. plebeia*.

After the many doubts expressed as to the identity of the Carboniferous *B. curta* and the Permian *B. plebeia*, we cannot now recognize (with Sir R. Griffith's specimen clearly before us) a real specific distinction; and *B. curta* stands as the oldest name. *B. plebeia*, however, may conveniently remain as a term of inferior grade for the very prevalent form with a rounded antero-dorsal angle (and hence less hatchet-shaped anterior extremity, as depicted in Reuss's figure of *B. plebeia*, Jahresbericht Wetterau. Gesell. 1854, p. 67, fig. 5, and in those given in the Transact. Tyneside Field-club, vol. iv. pl. 9. figs. 1, 2, 4, and woodcut 1, p. 145).

4. "*Bairdia gracilis.*" Synops. p. 165, pl. 23. fig. 7. As we have not seen this specimen, and as it is not referred to in the List of Localities, we have nothing to add to Prof. M'Coy's brief description of it, except that it seems to be the same as *B. subcylindrica*, Münster, sp. (Annals N. H. ser. 3. vol. xv. p. 409, pl. 20. fig. 13).

5. "*Cythere amygdalina.*" Synops. p. 165, pl. 23. fig 8. We have not seen this specimen; and, not being mentioned in the List of Localities, it has probably been mislaid. We have seen, however, a form corresponding to fig. 8 in the hand-specimen described further on as No. 10. Prof. M'Coy states that "*C. amygdalina*" is "common."

6. "*Cythere arcuata.* Yellow Sandstone; Dromard, Drapers-town, co. Londonderry." Synops. p. 165, pl. 23. fig. 9; Local. p. 48 ("Arenaceous shale," Local. p. 100). A blackish micaceous shale, rather hard but fragile, containing *Modiolæ* (?), and abounding with small Entomostraca, *Leperditia subrecta*, *L. Scotoburdigalensis*, *Kirkbya annectens* (sp.n.), and others, but nothing corresponding to the figure given of "*C. arcuata*," which we are inclined to believe to have been a specimen of *L. subrecta* partially hidden by matrix on its dorsal region. Prof. M'Coy

states that "*C. arcuata*" is "very common in the Carboniferous shales."

7. "*Cythere bituberculata.* Yellow Sandstone; Cultra, Holywood, co. Down." Synops. p. 165, pl. 23. fig. 10; Local. p. 48 ("Arenaceous shale," Local. p. 100). Light-grey shaly shell-grit, with *Modiolæ* (?), slightly micaceous. *Leperditia subrecta* abundant, and smaller obscure Entomostraca present, but nothing like the figure. A very similar, if not identical *Beyrichia*, however, occurs in Scotland (in the Coal-measures near Glasgow), and will bear the name *B. bituberculata*, M'Coy. Prof. M'Coy found his "*C. bituberculata*" common in one or two localities.

8. "*Cythere costata.* Yellow Sandstone; Cultra, Holywood." Synops. p. 165, pl. 23. fig. 11; Local. p. 48 ("Arenaceous shale," Local. p. 100). Light-grey solid shell-grit (*Serpulæ*, &c.), with crushed valves of *Leperditia subrecta* in abundance; but nothing visible to match the figure. We have, however, met with a *Kirkbya* in the Carboniferous Limestone of the south-west of England somewhat like fig. 11. Prof. M'Coy refers to "*C. costata*" as being about $\frac{1}{3}$ line in length, rare, and solitary.

9. "*Cythere cornuta.* Yellow Sandstone; Cultra, Holywood." Synops. p. 165, pl. 23. fig. 12; Local. p. 48 ("Arenaceous shale," Local. p. 100). Hard grey calcareous shale, with fish-scales and *Serpulæ*; or rather a Serpula-grit, much like the foregoing. *Leperditia Scotoburdigalensis* and *Kirkbya annectens* are present, but not the figured specimen. This we believe to have been *L. subrecta* with an extraneous morsel of matrix attached near the middle of the hinge-line (taken for the ventral border in Prof. M'Coy's description). It is stated to be about a line long and "not common."

10. "*Cythere elongata.* Yellow Sandstone; Cultra, Holywood." Synops. p. 166, pl. 23. fig. 15; Local. p. 48 ("Arenaceous shale," Local. p. 100). Grey Serpula-grit, with *Modiola* (?). There is no specimen like the figure (which appears to be an oculate *L. subrecta*, with its dorsal region buried in the matrix) now visible on the slab; but there are *L. Scotoburdigalensis*, *Kirkbya annectens*, two *Cytheres*, and a *Leperditia* (?) like fig. 8, "*Cythere amygdalina.*" M'Coy's "*C. elongata*" is stated to be half a line long and "very common in the shales of certain localities" (p. 166).

11. "*Cythere excavata.* Carboniferous Slate; Aghnaglogh, Clogher, co. Tyrone." Synops. p. 166, pl. 23. fig. 14; Local. p. 48 ("Arenaceous shale," Local. p. 100). Dark-coloured, shelly, fissile shale, with *Anthracomyæ* (?) and obscure casts of *Leperditia subrecta*; and the figure seems to have been based on some such specimen.

12. "*Cythere Hibbertii.* Yellow Sandstone; Larganmore, Bangor, co. Mayo." Synops. p. 166, pl. 23. fig. 15; Local. p. 48

("Arenaceous shale," Local. p. 100). Dark, fragile, slightly micaceous shale, with Crinoids, *Modiola* (?), &c., and containing obscure valves and casts of *Leperditia subrecta* (?) and *Kirkbya annectens*, but nothing exactly corresponding to the figure. Prof. M'Coy suggests that this "is perhaps *Cypris Scotoburdigalensis* of Hibbert; but this dwarf form of *L. Okeni*, smaller even than the variety *subrecta*, would hardly match "*C. Hibbertii*," which is stated to be "frequently upwards of a line in length," and "the largest species of *Cythere* of the Irish palæozoic rocks" (though "*C. inflata*" is said to reach 2 lines in length), except when regarded as one of the modifications of *L. Okeni*, which we believe to be the correct view of its relationship, though not contemplated in the work before us.

13. "*Cythere impressa.* Yellow Sandstone; Dromard, Drapers-town. Synops. p. 166, pl. 23. fig. 16; Local. p. 48 ("Arenaceous shale," Local. p. 100). Grey, fine-grained, micaceous, hardish shale, with *Modiola* (?) and *Serpula*. Some obscure casts of *Leperditia subrecta* and of other Entomostraca are present; but there is nothing exactly like the figure, which is stated to represent a form about half a line long, and "very common in the slates and shales of several districts" (p. 166).

14. "*Cythere inflata.* Lower Carboniferous Limestone; Ballyduf, Dungarvon, co. Waterford." Synops. p. 167, pl. 23. fig. 17; Local. p. 68. Grey crystalline shelly limestone, veined. Without any visible specimen of Entomostraca.

14*. White crystalline limestone, from Laracor, Trim, co. Meath (Local. p. 68). This has a small *Entomoconchus* and a minute hollow mould where a *Leperditia subrecta* has probably been. The figure may have been taken from a small *Entomoconchus*, a *Cypridella*, or other nearly related Cypridine Entomostracon.

Prof. M'Coy states that his "*C. inflata*" is the "largest and most abundant" of the Carboniferous *Cytheres* (from 1 to 2 lines in length), and that it abounds in the dark fœtid limestones, but is "rare in the light-coloured limestone, where *C. inornata* supplies its place."

15. "*Cythere inornata.* Yellow Sandstone; Cultra, Holywood." Synops. p. 167, pl. 23. fig. 18; Local. p. 48 ("Arenaceous shale," Local. p. 100). Bluish-grey fissile shale, fine-grained and micaceous, with numerous casts and broken valves ($\frac{1}{24}$ to $\frac{1}{12}$ inch long) of *Leperditia subrecta* and *L. Scotoburdigalensis*, sometimes showing the eye-spot. Prof. M'Coy states that his "*C. inornata*" is rarely $\frac{1}{2}$ line in length, and that it is "very common in several localities."

The Permian *Cythere* referred by one of us to *C. inornata*, M'Coy, is decidedly not the same as this, which is the common dwarf variety of *Leperditia Okeni*, Münster, sp.

16. "*Cythere orbicularis.* Yellow Sandstone; Bunowna, Easky, co. Sligo." Synops. p. 167, pl. 23. fig. 19; Local. p. 48 ("Carboniferous slate," Local. p. 100). Dark-grey, fine-grained limestone, with *Orthoceras*, &c. There are some small, obscure, roundish fossils, and a part of a valve of *L. subrecta*, but nothing like the figure.

17. "*Cythere pusilla.*" Synops. p. 167, pl. 23. fig. 20. "Yellow Sandstone; Cullion, Draperstown, co. Londonderry," Local. p. 48. "Middle Limestone," Local. p. 100. We have not had the specimen. It may have been a very small *Entomoconchus* (?) or a *Cypridella*. Prof. M'Coy refers to it as "the smallest of the *Cytheres*" ... "greatly abundant" ... "length about $\frac{1}{3}$ line" (p. 167).

18. "*Cythere scutulum.* Middle Carboniferous Limestone; Ballintrillick, Bundoran, co. Donegal." Synops. p. 168, pl. 23. fig. 21; Local. p. 75. Dark, compact, but softish, fissile shale, with Crinoidal joints, casts of *Aviculopecten*, &c. *Leperditia Okeni*, var. *subrecta* and *Scotoburdigalensis* are here plentiful, as single valves, of various sizes. Some have the eye-tubercle; and occasionally large left valves ($1\frac{1}{2}$ inch long) have their peculiar dorsal swelling. *C. scutulum* is doubtless *Leperditia subrecta*, Portlock, sp. The figured specimen must have had its dorsal edge partly imbedded, and the proportions are not well given.

19. "*Cythere oblonga.* Yellow Sandstone; Cullion, Draperstown." Synops. p. 167, pl. 23. fig. 22; Local. p. 48 ("Arenaceous shale," Local. p. 100). Dark-grey, fine-grained, fissile shale, with *Aviculopecten*. Obscure casts of *Leperditia subrecta* (?), but nothing that matches the figure. "*C. oblonga*" is stated to be "common," and about 1 line in length. It is probably *L. subrecta*.

20. "*Cythere spinigera.*" Synops. p. 168, pl. 23. fig. 23. We have not seen the specimen; but there is no doubt that it is *Leperditia Okeni* (probably var. *subrecta*), either with the eye-spot prominent, or with a small incrustation, such as we have seen in one of the specimens from Cultra, and such as we believe fig. 12 ("*C. cornuta*") and fig. 24 ("*C. trituberculata*") to have borne.

21. "*Cythere trituberculata.* Yellow Sandstone; Cultra, Holywood." Synops. p. 168, pl. 23. fig. 24; Local. p. 48 ("Arenaceous shale," Local. p. 100.) Hard, grey Serpula-grit, like No. 9, but more solid. We can find nothing like the figure (probably a small *Leperditia* with adventitious concretions or bits of the matrix). *L. Scotoburdigalensis* is present; also a *Cythere* having an outline somewhat near that of the figure; and there are numerous specimens of *Kirkbya annectens*, which, though more or less lobed or tubercled, is not at all like fig. 24.

22. "*Cythere gibberula.* Middle Carboniferous Limestone;

Ballintrillick, Bundoran." Synops. p. 166, pl. 23. fig. 25; Local. p. 75. Darkish grey micaceous shale, with *Aviculopecten.* The specimens are of the same form as "*C. scutulum,*" and are decidedly *Leperditia Okeni,* var. *subrecta* (about $\frac{1}{16}$ inch long). "*C. gibberula*" is said to occur "in great numbers in the shale of some localities." The figure indicates a large hump on the middle of the valves, which Prof. M'Coy notes as remarkable; but the specimens before us are not characterized by any particular protuberance.

The following labelled specimen accompanied the others.

23. "*Cythere subrecta* (Portlock, sp.). Yellow Sandstone; Larganmore, Bangor, co. Mayo." Griffith's List of Localities, Geol. Soc. Dublin Journ. vol. ix. p. 48 ("Arenaceous shale," Local. p. 100). Hardish dark-grey micaceous shale, with abundant small obscure casts of *Leperditia Okeni,* var. *subrecta* (about $\frac{1}{16}$ inch long).

The following table shows the conclusions we have arrived at, judging by evidences and probabilities, respecting the Bivalve Entomostraca figured in pl. 23, 'Synops. Charact. M. Limest. Foss. Ireland:'—

Prof. M'Coy's Names.	Dimensions in lines.	No. in this art.	Corrected Names.
Fig. 4. Entomoconchus Scouleri	10×9	1	Entomoconchus Scouleri.
5. Daphnia primæva	$1\frac{1}{3}\times\frac{3}{4}$	2	Cypridina primæva.
6. Bairdia curtus	1	3	Bairdia curta.
7. —— gracilis.....	$\frac{1}{2}$	4	B. subcylindrica, *Münster,* sp.
8. Cythere amygdalina.....	$\frac{1}{2}$	5	Leperditia amygdalina.
9. —— arcuata.....	$\frac{1}{2}$	6	L. Okeni, *Münster,* sp., var. subrecta, *Portlock,* sp.
10. —— bituberculata	$\frac{1}{3}$	7	Beyrichia bituberculata.
11. —— costata.....	$\frac{1}{2}$	8	Kirkbya costata.
12. —— cornuta	1	9	Leperditia Okeni, *Münster,* sp., var. subrecta.
13. —— elongata	$\frac{1}{2}$	10	,, ,,
14. —— excavata	$\frac{1}{2}$	11	,, ,,
15. —— Hibbertii	1	12	,, ,,
16. —— impressa	$\frac{1}{2}$	13	Beyrichia (?).
17. —— inflata	$1\frac{1}{2}$	14	Entomoconchus (?) vel Cypridella (?).
18. —— inornata	$\frac{1}{2}$	15	Leperditia Okeni, *Münst.* sp., var. subrecta; vel var. Scotoburdigalensis.
19. —— orbicularis	1	16	Cypridella (?).
20. —— pusilla	$\frac{1}{3}$	17	Entomoconchus (?) vel Cypridella (?).
21. —— scutulum	1	18	Leperditia Okeni, *Münst.* sp., var. subrecta.
22. —— oblonga	1	19	,, ,,
23. —— spinigera	$1\frac{1}{4}$	20	,, ,,
24. —— trituberculata	$\frac{1}{2}$	21	,, ,,
25. —— gibberula.....	$\frac{1}{2}$	22	,, ,,

Thus it will be seen that we refer figs. 12, 13, 14, 15, 18, 21, 22, 23, 24, and 25 to *Leperditia Okeni* without any doubt. They comprise the varieties *subrecta* (Portlock) and *Scotoburdigalensis* (Hibbert). The locality of fig. 23 is not mentioned; but all the others are from *shales* either of the "Yellow Sandstone," of the "Carboniferous Slate" (fig. 14), or of the "Middle Carboniferous Limestone" (figs. 21 & 25). Figs. 10, 11, & 16 are also in *shales* belonging to the "Yellow Sandstone."

Figs. 4, 6, 17, & 20 refer to specimens in *limestone*—from the "Lower Carboniferous Limestone" (figs. 4 & 17), the "Carboniferous Slate" (fig. 6), or the "Middle Carboniferous Limestone" (fig. 20). Of the locality and matrix of figs. 5, 7, 8, & 23 we have no indications.

In his 'Notice respecting the Fossils of the Mountain-Limestone of Ireland,' &c. (4to, Dublin, 1842), Sir R. Griffith thus divided the Lower Carboniferous formation of Ireland (p. 4).

1. Upper Limestone. 2. Calp or Calp-slate, consisting of alternations of shale and argillaceous limestone, with occasional beds of pure limestone and rarely of sandstone—and less persistent than the Upper and Lower Limestones. 3. Lower Limestone. 4. Carboniferous Slate, or schistose beds, usually calcareous and alternating with argillaceous limestones, similar to those of the Calp. 5. Yellow Sandstone, consisting of sandstones intercalated with slate or shale and occasionally with limestone. Nos. 4 & 5 are wanting in some localities; and sometimes No. 4 only is wanting. (See also Sir R. Griffith's Geological Map of Ireland, with its marginal explanations, 1854.)

At page 22, Sir R. Griffith states that *Entomoconchus Scouleri* occurs in the Lower Limestone of the southern and middle districts of Ireland.

Bairdia curta	occurs in the	middle and northern.
—— *gracilis*	„	northern.
Cythere cornuta	„	northern.
—— *inflata*	„	southern and middle.
—— *inornata*	„	northern.
—— *spinigera*	„	northern.

These determinations were modified probably, and corrected, in Prof. M'Coy's Memoir (1844), and in Sir R. Griffith's List of Localities' in 1860.

The Geological Surveyors of Ireland, however, have found it impracticable to fully adopt Sir R. Griffith's nomenclature of the Lower Carboniferous formation. According to their experience, his "Yellow Sandstone" is not sufficiently definite in its upper

and lower boundaries, being in some places wholly "Carboniferous," at others wholly made up of "Old Red," and elsewhere combining portions of each; and they restrict the term to the upper portion of the Old Red Sandstone series, distinctly below the beds with marine fossils. They consider that the "Carboniferous Slate" (about 150 feet thick), below the "Carboniferous Limestone" (3000 feet), in the north-eastern districts, is the same as the "Lower Limestone Shales" of England, and that the "Carboniferous Limestone" thins away on the south-west and is wholly replaced by the "Lower Limestone Shales" (about 5000 feet), which are there *cleaved*, and therefore known as "Carboniferous Slate." The latter, in consequence, are in the south-west the equivalents of the "Carboniferous Limestone" and "Lower Limestone Shales" together in the north-east.

As this arrangement simplifies the order and succession of the "Lower Carboniferous" strata, we use both nomenclatures in the annexed table of the Entomostraca that we have observed in Sir R. Griffith's specimens.

We have also seen other Carboniferous Entomostraca from Ireland, which have been kindly submitted to us by the Officers of the Geological Survey of Ireland.

I. From the "Carboniferous Limestone."

1. Meath (Map, Sheet 33/4); Clonalvy, near Naul. *Entomoconchus Scouleri.*

2. Meath (Sheet 27/1); Duleek. Light-grey limestone. *Cypridina primæva* (gregarious).

3. Dublin (Sheet 7/1); Oldtown. *Leperditia Okeni.*

4. Tipperary (20/2); Carrig-Church, about 2½ miles north-west of Nenagh. Dark-coloured Polyzoan Limestone, with Echinoderm fragments and Shells. *Leperditia subrecta.*

5. Limerick (Sheet 11/2); Ballynolan, near Pallaskenry. *Entomoconchus Scouleri.*

6. Limerick (10/4); Glenbane, near Askeaton (No. 4253 *a*). *Leperditia Okeni.*

7. Limerick (29/1); Rathkeale. Grey limestone with *Fenestella. Leperditia subrecta.*

8. Cork (76/3); Ballyvodock, about 2 miles south-west of Middleton. Grey fossiliferous limestone. *Entomoconchus Scouleri* (gregarious).

II. "Lower Limestone Shale."

1. Londonderry; Ballrascreen. Hard dark-grey shale, micaceous, full of small *Leperditiæ*. (Portlock's Collection.) *L. subrecta, L. Scotoburdigalensis,* and still smaller obscure forms.

Sir R. Griffith's Names of the Formations.	Formations according to the Geological Survey.	Localities.	Genera and Species.	Nos. in this Article.
Upper Carboniferous Limestone		Enniskillen, Leitrim	Cyclus	1**
Middle Carboniferous Limestone		Ballintrillick, Donegal (Shale) .	Leperditia subrecta	18, 22.
			L. Scotoburdigalensis ..	18, 22.
Lower Carboniferous Limestone	Upper Carb. Limestone?	Little Island, Cork	Entomoconchus Scouleri	1.
,, ,, ,,	,, ,,	Millicent, Kildare.....	E. Scouleri.....	1*.
,, ,, ,,	,, ,,	Laracor, Meath.....	E. Scouleri?	14*.
Carboniferous Slate	Lower Limestone Shales?	Granard, Longford (Limestone)	Bairdia curta	3.
,, ,,	,, ,,	Aghnaglogh, Tyrone (Shale) ..	L. subrecta.....	11.
Yellow Sandstone	Lower Limestone Shales	Dromard, Londonderry (Shale)	L. subrecta.....	6, 13.
			L. Scotoburdigalensis ..	6.
			Kirkbya annectens	6.
			Cythere, sp.	6.
,, ,,	,, ,,	Cullion, Londonderry (Shale)..	L. subrecta.....	19.
,, ,,	,, ,,	Cultra, Down (Shale)	L. subrecta.....	7,8,9,10,15.
			L. Scotoburdigalensis ..	7,9,10,15,21.
			L. impressa	7, 10.
			L. amygdalina	10.
			Kirkbya annectens	9, 10, 21.
			K. costata	8.
			Beyrichia bituberculata..	7.
			Cythere Rankineana....	7, 10.
			Cythere	10, 21.
			Cythere	7.
,, ,,	Lower Limestone Shales?	Larganmore, Mayo (Shale)	L. subrecta.....	12, 23.
			Kirkbya annectens	12.
,, ,,	,, ,,	Bunowna, Sligo (Limestone*)..	L. subrecta.....	16.

* This is also referred to the "Carboniferous Slate."

2. Tyrone; Tinnaglogh. Soft grey shale. (Portlock's Collection.) *L. subrecta* and *L. Scotoburdigalensis.*

3. Fermanagh; Kesh. Dark-grey hard shale, full of Entomostracous valves. (Portlock's Collection.) *L. Scotoburdigalensis*; also *Beyrichia* and *Bairdia*?

4. Fermanagh; Clebby. Soft grey shale, with Bivalve Shells. (Portlock's Collection.) *L. subrecta.*

5. Wexford (42/2); Whitestown House, Drinagh, near Wexford. Dark-blue hard shale, with pyrites. (H. 4321.) *L. subrecta* and smaller obscure forms.

III. "Carboniferous Slate."

1. Cork (74/2); Glen near the city of Cork. Dark-grey schist, weathering brownish: a hardened cleaved shale, with small Brachiopods. *L. subrecta* (distorted).

2. Cork (65/4); Bilberry Hill, N.E. of Middleton. Purplish and rusty schist or hardened cleaved shale, with *Cypricardia*, Encrinital joints, and distorted Entomostracous valves. This schist lies between the "Old Red Sandstone" and real "Carboniferous Limestone" continuous with that of Little Island. This "Lower Limestone Shale" near Cork is 1000 ft. thick, and all cleaved into slate ("Carboniferous Slate"). *L. subrecta* and *L. Scotoburdigalensis* (distorted). These compressed schists, with elongated and otherwise distorted *Leperditiæ*, appear to be identical with some of the so-called "Cypridinen-Schiefer" of Germany. Shales with *Beyrichia arcuata* (?) distorted (from Granton and elsewhere) resemble other specimens of "Cypridinen-Schiefer." *Entomis* supplies the other so-called "Cypridinæ" of these Rhenish strata.

3. Cork (118/1); Relane Point, south side of Bantry Bay. Grey schist, with pyrites, and weathering rusty. Gasteropods, &c. This schist is probably 2000 or 3000 feet above the top of the "Old Red" beds. *Leperditia Scotoburdigalensis.*

4. Cork (67/2); Youghal. Drab schist, with an ochreous parting which is full of well-preserved Entomostraca. This is 500 feet above the "Old Red" beds, and 300 feet below the "Carboniferous Limestone." *L. suborbiculata* and *L. parallela.*

5. Cork (105/1); Coory Commane Mountain, on the east side of the Glen of Coomhōla, Bantry Bay. Grey schist, micaceous: a hardened squeezed shale, with small Bivalves. This specimen was from the middle of the "Coomhōla Grits," 1800 feet above the top of the "Old Red," and where these grits are 3000 feet thick. *L. Scotoburdigalensis* (distorted).

Mr. Joseph Wright, F.G.S., has sent us a piece of "Carboniferous Slate" from Shanbally, Cork, containing casts of a *Cythere* (indeterminable).

In the Museum of the Geological Survey, at Jermyn Street, we have seen the following specimens from the Lower Carboniferous rocks of Ireland:—

1. "Carboniferous Limestone," near Kildare. *Entomoconchus Scouleri* (gregarious).

2. "Lower Limestone Shales."

a. Fermanagh (Sheet 18, Nos. 3 & 4; and Portlock's 'Geol. Report,' pl. 24. fig. 13 *c*). Grey shale. *Leperditia subrecta* and *L. Scotoburdigalensis.*

b. Kilkenny (Sheet 31/4); south of Knocktopher, and about a mile west of Ballyhale. Argillaceous schist, containing *Rhynchonella pleurodon,* and having rusty facings and badly preserved casts of *Leperditia subrecta.*

X.—*Notices of British Fungi.* By the Rev. M. J. Berkeley, M.A., F.L.S., and C. E. Broome, Esq., F.L.S.

[Plate II.]

[Continued from vol. xv. ser. 3. p. 452.]

1104. *Agaricus* (Amanita) *lenticularis,* Lasch in Linn. 1827, No. 18.

Coed Coch, Oct. 1866.

A single specimen of this magnificent species, according exactly with a figure received from Fries, occurred last autumn in the plantations surrounding the gardens at Coed Coch. It is remarkable for the great development of the ring and the smooth pinkish-tan pileus.

1105. *A.* (Lepiota) *Friesii,* Lasch in Linn. 1828, no. 9.

Jedburgh, A. Jerdon, Esq.

1106. *A.* (Tricholoma) *saponaceus,* Fr. Ep. p. 35.

In woods. King's Cliffe, Sept. 1, 1865.

This occurred in great profusion and perfection. *A. graveolens,* Sow., which is quoted under *A. saponaceus* by Fries, is undoubtedly *A. gambosus,* as appears from the original drawing and the notes which accompany it.

1107. *A.* (Clitocybe) *pithyophilus,* Fr. Ep. p. 62.

In fir-woods. Coed Coch, Oct. 19, 1865.

1108. *A.* (Clitocybe) *trullæformis,* Fr. Ep. p. 68.

On the border of a fir-wood. Coed Coch, Oct. 27, 1865.

The rather distant gills, which are connected with veins and infundibuliform pileus, distinguish this species, which is not hygrophanous.

**A.* (Clitocybe) *inversus,* Scop. Carn. p. 445.

Several tufts of this species occurred late in the year at